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Bulletin of the American Association of Jesuit Scientists

EASTERN STATES DIVISION

VOL. XXXII

JANUARY, 1955

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Manuscripts are to be submitted to associate editors of the appropriate section and may be submitted directly to the editor in chief. Clear manuscript, preferably typed, with wide margin to the left, with double spacing between lines, is desirable. Please try to follow the typographical style of the most recent issue of the BULLETIN. Line drawings should be submitted on Bristol board, or similar material, and done in India ink. Figure number should be written on this in pencil. Titles for drawings, with figure numbers, should be typed on a separate sheet. Please try to minimize footnotes. Appended references and bibliographies, clearly so marked, should be done in the style of the A.A.A.S. publication, *Science*.

Obituary

REVEREND JOSEPH ASSMUTH, S.J.—1871-1954

June 11, 1954 marked the passing from this life of the Reverend Joseph Assmuth of the Society of Jesus at Canisius House in Cologne, Germany. Father Assmuth had spent a quarter of a century or more as a Jesuit biologist at Fordham University in this country. His acclaim in his field preceded his arrival here and his over-all career should be recorded in these pages. For it echoes the tale of every Jesuit, great or obscure, loved by the masses or by a select clientele, acclaimed here and banished there, working out in his own life the Kingdom of Christ and touching the spark of inspiration where the tinder is dry for the conflagration.

Joseph Assmuth was born during the Franco-Prussian war at Bachwitz, Liebenwerda Parish in the Saxon Diaspora of Germany on February 21, 1871. After the usual elementary schooling and two years of private instruction he attended Gymnasium in Paderborn and earned his certificate in 1892. He entered the Society of Jesus on April 10, 1893 at the Novitiate of the German Province in exile at Blijenbeek, Limburg, the Netherlands. Through the vicissitudes of province fission, work on the foreign missions, both world wars and their interim, he eventually became incardinated in the Eastern Province of the Society in Germany, a non-existent jurisdiction at the time of his first vows—, one whose air he seldom breathed to the day of his demise.

The years 1894 to 1895 found Brother Assmuth studying rhetoric at Exaaten, again beyond the reaches of the Reich. Here he got to know the great Jesuit entomologist, Father Erich Wasmann and probably did not recognize in the young member of the *Domus Scriptorum* a mentor and inspiration for his future work.

There followed three years of philosophical study, 1895-1898, at Ignatius College, still west of the border, at Valkenburg in the Limburg section of the Netherlands. Here he was *manducted* into the study of biology by Father Christian Boetzkes. The calciferous sandstone caves along the valley from Valkenburg to Maastricht provided a natural laboratory for Father Boetzkes and his group of budding naturalists. Father General's walk on Tuesday afternoons and our Holy Father Ignatius' villa on Thursdays and holidays provided the occasion for arming themselves with saws, picks, shovels and mad-docks for excavating what was eventually to become the Boetzkes Museum of about 800 fossils from the district, now housed in the Museum of Natural History in Maastricht.

As a *regent* Mr. Assmuth found himself teaching English, Latin,

and Mathematics in the Preparatory Division of the University College of St. Francis Xavier in Bombay, India. Here he kept up his scientific avocation and provided colleagues at home with new and exotic specimens to their heart's desire. One of these was dubbed into the literature, *Paussus Assmuthi*, by Father Wasmann. Another, a newly discovered species of termite, male in early life and female later, became known as *Termotoxenia Assmuthi*.

The years 1902-1906 saw Father Assmuth a theological student at Valkenburg again, where he was ordained to the Holy Priesthood in 1905. After theology he studied for a year under Professor Chun at the University of Leipzig and then went on to the University of Berlin. Here he got to know such greats as Schulze, Schwendener, Heymons and Deegener. By dint of filled days and full years of work he earned his doctorate of philosophy, majoring in Zoology and minor-ing in Botany and Paleontology, after a record course of six semesters, the award coming on August 13, 1910.

His dissertation, entitled "The Anatomical and Histological Investigation of *Termotoxenia Assmuthi* Wasm." reveals an enviable mastery of microscope technique. He worked on one of the most interesting creatures known in his day, a wingless insect two millimeters in length. The Imperial Leopoldine-Caroline German Academy of Naturalists at Halle on the Saale published this work completely with its numerous photomicrographs at a cost of 8,000 marks. It appears in volume 98 of their *Nova Acta*.

On his return to India in 1910, he became Professor of Biology at the University College of St. Francis Xavier in Bombay and there taught biology and geology. He became increasingly absorbed in the study of termites hoping to discover methods for the prevention of the destruction of wood and similar materials. At the same time he kept a flow of specimens streaming to colleagues in the homeland. A rare termite guest, the *Assmutherium Rostratum*, is described in the 59th volume of the *Leipziger Zoologischen Anzeiger*. He enjoyed some government subsidy, at least in the form of railway passes for him and his servants. His reputation with all classes, Christian and pagan, kept growing apace until the first world war thundered over the Himalayas to shatter a work so ably founded.

Shortly after outbreak of war he was interned with other Jesuit missionaries at Khandala. On March 29, 1915 he boarded the *Golconda*, a prisoner of the British, on a circuitous voyage to England through U-boat infested waters, arriving in England on May 16th. Here he was interned in London's Alexandra Palace for a month until a prisoner of war exchange got him back to the Reich. During this episode priceless specimens were lost or damaged. He then became a chaplain to the 13th Reserve Division that saw action in France, returning after the breakthrough of 1918 to consider the professional program of the biologist of the future.

Delays set in. In Muenster in Westphalia he worked as a re-

ligion instructor at St. Anthony's, a school for girls. He then became natural science and mathematics instructor at the Catholic Pro-Gymnasium in Hamburg. Finally he was called to Fordham University in New York to take the position of Professor of Biology.

His work at Fordham over the years is known to many. One recalls the publicity notices he accrued such as consultations by the City of New York on the extermination of the cockroach pest that threatened to overrun certain sections of the Metropolis. We remember with delight his entertaining reminiscences and humorous anecdotes at our Association meetings, especially during the *bau-tu* hour.

Less well known perhaps was his chaplaincy of the *Kolpingverein* in New York, a German Catholic social club, with branches all over the country and the wide world. He became President of the New York unit in 1924; the following year he became Vice-President of the North American division. With its members he celebrated his silver jubilee as a priest in 1930; his seventieth birthday in 1941; and his 50th anniversary of entering the Society in 1943. He became National President of Kolping in 1949 and spent the summer of 1949 in Germany representing the New York unit at the one hundredth anniversary of the founding of the Kolping unit in Cologne.

In June 1950 Father Assmuth became Professor Emeritus of Fordham University. During October 1950 he was named Honorary President of the New York Kolping unit. He then left New York for Cologne for the last time. On the 10th of April, 1953, he celebrated in Cologne his sixtieth anniversary in the Society of Jesus. He did not live to celebrate his fiftieth as a priest. *Antiquus dierum, requiescat in pace! bafSJ*

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Varia

HOW TO PREPARE APPLICATIONS FOR GRANTS-IN-AID FOR RESEARCH PROJECTS¹

WHAT IS A GRANT-IN-AID?

It is a sum of money obtained from outside the University to defray, in whole or in part, the expenses involved in carrying out a specific research project.

The advantages of obtaining grants-in-aid are many. They enable professors to engage in research, which would otherwise be impossible. Besides assisting the Professor, they often allow of salaries for good Graduate students, and this helps the students and enables the Department to attract more good ones. Grants also often allow the purchase of equipment, which would otherwise be beyond the reach of a departmental budget.

It is understood that this brochure deals with applications for grants which will assist in the prosecution of *basic* research, here at Fordham. It is this kind of research that integrates with the intellectual life of the professor and the students, and helps the University fulfill its function as an educational institution.

Inasmuch as the Professor, in applying for and using grants-in-aid, acts as a member of the University, Fordham has the duty of assisting and regulating all activities connected with sponsored research.

KINDS OF GRANTS

1. In some cases a contract is entered into between the University and the source of the funds, stipulating the terms under which the particular project is to be carried out by the Professor initiating the application. Such contracts bear the President's signature and also the signature of the Professor, and are audited at intervals by the other party to the contract, the source of the funds.

2. In other cases no contract is drawn, but funds are made available to a Professor, through the University, by some Foundation in-

¹ This article is a reprint of a pamphlet published by the Office of Research Services at Fordham University. This pamphlet is available at the rate of one dollar for four copies, although individual copies will be sent for those applying for them on official letterhead. Apply to Rev. J. Franklin Ewing, S.J., Director, Office of Research Services.

terested in the work he is doing. In these cases the money is deposited by the Foundation with the University Treasurer, to be allocated to the Professor as needed. Usually only internal auditing is required.

THE APPLICATION

HOW APPLICATIONS ARE INITIATED. The initial idea for a research project, which needs sponsoring funds, may come either from an individual Professor or from a group of Professors. In the latter case, as we shall note later, one of the Professors becomes designated as the "Principal Investigator" or "Director" of the project. The individual Professor or the principal investigator should first discuss the project and the proposal with the head of his Department. The reason for this is the fact that the Head of Department should know the capabilities and existing work-loads of the investigators, as well as the general character of the work of his Department, with which the project should be in harmony. The Professor or Principal Investigator works out with the Head of Department the scope of the project as well as a tentative itemized budget of the expenses. (The Professor may, if he wishes, consult with this Office beforehand, especially with regard to such questions as the feasibility of funds for the project.)

Since all applications for grants-in-aid must go through the Office of Research Services, and have the President's signature affixed to them, there should be some uniformity in presentation. For this reason, certain general rules are given herewith to assist a Professor in writing up a preliminary proposal, especially if it is his first one.

Bulletins of information concerning application procedures are available from some sources, e.g., the National Science Foundation, the Office of Naval Research. In some cases, too, the source of funds supplies the forms to be filled out by the applicant (e.g., the United States Public Health Service). The Office of Research Services will assist the Professor in obtaining relevant bulletins and forms.

More frequently (and this is particularly true of the private Foundations), the form of the application is not specified. In such situations the instructions that follow will be of help to the Professor.

These instructions are divided under the following three headings: I. Draft of Application for Usual Grants; II. Draft of Application for Assistance in Writing a Book; III. Extension and Renewal Applications.

I. DRAFT OF APPLICATION FOR USUAL GRANTS. The draft as prepared by the Professor should contain detailed pertinent information under the following topical headings:

1. *Title.* The title of the proposed project should be as complete as necessary in order to afford the reader a clear perception of the

field and importance of the suggested project. For example: "The Personality-Sketch Test as an Objective Psychiatric Screening Aid for Pilot Cadets" or "A Study of the Purine and Amino Acid Composition of Normal, Embryonic and Neoplastic Tissue." (A shorter title is often devised for the label which the Office of Research Services attaches to the cover of the folder containing the application).

2. *Description.* The description of the work contemplated should normally include, as its primary element, the objective of the research and its relation to the present state of knowledge in the field. Pertinent literature should be included, noting work in progress elsewhere, if any, in the same field of study. Emphasis should be placed upon the timeliness of the project proposed. In this section the object is to make the proposal sufficiently attractive to invite financial aid. In other words, it is here, primarily, that the investigator must "sell the project" to the source from which assistance is sought.

3. *Procedure.* This section should contain a clear outline of the plan of research and of the particular methods which are to be used. This description of the procedure to be used in prosecuting the research project should be couched in professional terms. The governmental and non-governmental sources of funds all have technical advisers, who will evaluate the project.

4. *Personnel.* The subject matter under this heading should include short biographical sketches of the investigator and his collaborators (assuming there are such of professional character)—not usually, however, of graduate students who may be helping in the work of research. State qualifications, degrees, experience, positions held, and publications to which the Professor or investigator has contributed, especially those in fields most closely related to the type of research undertaken.

If the project involves a multidisciplinary approach, and will employ the services of several Professors, these should be ranked, after the model of their academic rank. Thus, the principal investigator can be designated either as that, or Director; there may be Associate Directors or Investigators; there may also be Assistant Investigators; all depending on the needs of the project. If there are many Investigators, then the information about each should be the equivalent of that afforded for the single investigator.

Another category of personnel may be that of *Consultants*. These may be either paid or unpaid, according to circumstance. It should be pointed out here that one or more Consultants, of considerable renown in the field of the research project, may considerably increase the confidence of the source of funds in allotting a grant for the project.

5. *Facilities.* For the Natural Sciences, the available apparatus and equipment should be listed. In the case of the Humanities or Social Sciences, library facilities and other available research sources should be mentioned. Often, there will be cooperating organizations. These, too, should be listed.

6. *Budget.* This is usually set up for either the academic or calendar year, even when the period of the proposed research is longer than that. The proposed duration of the task of research should be mentioned, together with the beginning date and the date of expected completion, and any variation from the first-year budget, if such variation be anticipated.

Budgets are generally itemized under the following heads:

- a. *Salaries.* Some grants allow for a part-time or a full-time salary for the principal investigator, but most do not. If a part-time salary is requested, the easiest way to indicate the basis for the salary figure is in terms of the percentage of the theoretical 40 hour week which would be spent on the project. Graduate students may be listed (not necessarily by name) for amounts commensurate with the academic degrees they hold and the amount of time put in on the project. The salary scale at any given time should be learned from the Treasurer's office; these items may be left open for the office of Research Services to enter them in the final copy.
- b. *Permanent or Capital Equipment.* This includes non-expendable apparatus of long life and of substantial monetary value. Often one of the principal reasons for seeking a grant is to enable the Professor to purchase expensive and special types of equipment such as the University ordinarily would not provide because of the restricted uses for which it would be adapted. Regulation equipment is presumed to be available without assistance financing.
- c. *Expendable Equipment and Supplies.* This includes such necessities as chemicals, glassware, photostats, manuscript stationery for monographs and reports, and in some cases, special expenses for postage and long-distance communication.
- d. *Travel.* This embraces the foreseen necessary costs of travel for field work, for visiting special libraries, and for consultation with other experts in the particular field of research. It does not include travel to conventions which the Professor normally would attend in line of duty.
- e. *Publications.* Figures under this heading would include financial provision for the publication of research reports requiring a considerable expenditure.
- f. *Clerical Help.* The typing of special reports frequently involve expense not ordinarily covered under salaries. Such extraordinary expenses should be listed under this heading.

- g. *Overhead.* This is an item embracing indirect costs invariably involved in obtaining required products and services, such as supplementary personnel, materials, supplies, equipment, utilities and such other costs as are not charged directly to the project; for example, salaries of administrative personnel, building space occupied, heating, policing where necessary, and extraordinary utility expenses. Since the percentage of overhead varies with the different grantors, this item should be left blank by the Professor unless he knows the actual requirements.

7. *Letters of Recommendation.* Especially when a Professor is beginning his research career, letters of recommendation from well known figures in the particular field or discipline in which the project will fall, are advantageous. They should be presented as supporting documents, in the manner of an appendix at the end of the project; however, their presence and bearing should be mentioned in the Description (No. 2).

8. *Other Aids in Presentation.* The applicant should not forget the value of photographs, graphs, and like visual aids in facilitating appreciation of his project.

The Office of Research Services will have the application mimeographed or multilithed as seems best, and the signed copies (of which there usually will be at least two, and sometimes more, according to the ideals of the particular source of funds) will be enclosed in attractive folders. Other copies, as demanded, will usually accompany the signed copies, but without folders. On the average 25-50 copies are prepared.

II. *WRITING BOOK.* Since research involved in the writing of a book differs considerably from that required in the natural or social science projects contemplated above, a somewhat different presentation is to be expected.

Here are some suggestions that may be helpful:

Specify—

- I. The book's particular value and appeal:
 - a. The need for such a work;
 - b. The audience aimed at;
 - c. Books already available, but not definitive, in the field explored;
 - d. Qualifications of the author.
- II. The nature of the work:
 - a. General plan of the volume;
 - b. Chapter headings;
 - c. A sample chapter, or general outline.

In addition, the same material should be provided for such an application as is listed under Nos. 4 to 8 inclusive above.

III. EXTENSION AND RENEWAL APPLICATIONS. As in the case of new proposals, the Head of the Department should be consulted, and the proposed budget should be gone over carefully with him. Not so much information need be given, usually, in the case of an extension or a renewal. The budget, of course, must be carefully itemized.

AFTER THE APPLICATION

WAITING. As a general rule, a period of from one to four months will elapse before a final decision may be expected from the source solicited. This period varies as a function of several factors, e.g., the times of the year when the Board of Directors of a Foundation meets to consider proposals.

If the source of funds requests additional information, that is a good sign. It means that they are interested. A certain amount of adjustment, either by word of mouth or by letter, may occur in the case of private foundations, and even when one is dealing with a Government agency.

IF THE GRANT IS GIVEN. You will have to remember that you have taken on certain obligations, in accepting the grant-in-aid. The regulations or desires of the source of funds with regard to progress reports and final reports and mention in publications are indications of simple justice, as well as requirements to be fulfilled if you wish future aid. The audit of the accounts will be taken care of by the Treasurer's Office, in any case, but friction will be reduced if you keep your own books straight. The bookkeeping and budgetary requirements of a lump sum grant from a private foundation are considerably less than those required by a Government agency. This latter will take a dim view of a shift of funds from, let us say, "Travel!" to "Expendable Supplies." But again, it is wiser to talk over any major changes in budgetary allocation with the Treasurer's Office, even in the case of a grant from a private foundation.

Letters of thanks are sent out by this Office; but this does not preclude a letter from you.

SUMMARY OF STEPS IN TAKING APPLICATION FOR GRANTS-IN-AID

1. The Professor discusses with the Head of the Department the research or book project for which he intends to ask for a grant.
2. The Professor draws up a Preliminary Draft of the project, signs his name to it, obtains the signed approval of his Department Head, and sends or brings the application to the Office of Research Services.

3. The Office of Research Services sees to it that the Preliminary Draft is properly executed, and
 - a. sends one copy to the Academic Vice-President for his information and approval, and one copy to the Dean of the Graduate School;
 - b. sends another copy to the Assistant Treasurer for approval of the budget.
4. The Office of Research Services has the required number of final copies made up and placed in attractive folders.
5. Signatures are obtained for the final copies from
 - a. the Professor, and
 - b. the President of the University.
6. A covering letter over the signature of the Director of Office of Research Services is sent with the final application to the source or sources from which the funds are to be solicited.
7. Copies of the final application are sent to:
 - a. the Professor who makes the application;
 - b. the Head of his Department;
 - c. the Assistant Treasurer of the University.

THE CATHOLIC AS A NATURAL SCIENTIST¹

KARL F. HERZFELD, Ph.D.

*Chairman, Department of Physics
The Catholic University of America*

One of the often repeated accusations of the enemies of the Church is that the Church is the enemy of science. The best answer to this accusation is to be able to point to the activities of Catholic scientists. And this answer alone is sufficiently interesting to warrant further discussion of the point. I might ask whether a discussion of this point has been made superfluous in the last few weeks by a talk Our Holy Father gave in which he warned against over-emphasis on the technological spirit. Therefore, before we go into the main Talk we must first discuss what the Holy Father meant. Now, of course, I can only tell you what I think he meant. The main point involved is this: that we as Catholics do not doubt the primacy of the spirit. Our main object in life is, of course, to save our own souls and the souls of others. However, the majority of men have to use as a means towards this end some natural activity, and the problem which we are going to discuss is science as one of these natural activities. What the

¹ Second annual Ahern-Quigley lecture given at Weston College, March 21, 1954.

Holy Father warned against is overturning the scale of values which I have just described, and placing the natural activity which should be the means above the spiritual which should be the end. This has happened in other circumstances. Individual countries at various times have seemed to make political activities their ultimate aim, as, for example, when it was felt that political independence would be the salvation of everything. This has happened in other countries; it is the same kind of thing against which the Holy Father warns in the United States of America. There is no danger that political activity in this country will be overvalued and taken as an end instead of a means today, but there is the danger that technological activity will be. We begin, then, by taking it for granted that we do not intend to judge the natural as against or above the spiritual. We do intend, however, to compare the natural activity of a scientist with other natural activities. As you can see, I have used the word "natural" in two different senses. The Holy Father's statement emphasizes the right order and subordination of any natural activity to the spiritual. Now, taking that for granted, our question is this: "Why should a Catholic choose natural science as a profession?" We can discuss this question on two different levels. The first is a philosophical one: "Why should anyone choose any particular profession?" And then we can be more specific and ask: "Why should a Catholic choose *this particular* profession?"

In the choosing of any profession, two factors are involved. One you may call, if you like, the subjective or psychological. The other involves a rational justification of the profession itself, an answer to the question: how is that profession related to the common good? This applies to science just as well as to any other profession. Now if you ask different individuals what is the justification for being a scientist, you will get all kinds of answers, most of them beside the point. Many Marxists and others will say that science is justified solely by the material benefits it brings to humanity. If you ask the scientists themselves, in most cases, they will tell you that they do science because they enjoy it. Of course, both answers are wrong, but as usual, there are grains of truth in each of them. The first errs in identifying the common good with material good. The second errs in mixing up the psychological with the rational justification.

Returning, then, to the question, we will somewhat invert the order and begin with the psychological side. There, the first requirement is one of capabilities. This, as far as I know, is simply the practice of the virtue of prudence. One characteristic of this virtue is that you do not try to do what you are not able to do. There is of course here a debate, which we will not enter into and about which the psychologists might have more to say, on how specific these abilities

are. It is clear that to be able to be a natural scientist you need both a high degree of intelligence and a high degree of industry. But I have always felt that these gifts vary. Someone who might make a first-class naturalist might make a very poor mathematician and vice versa. But whether that is really specificity of gifts or the result of early training I cannot really tell. There are some people who are better at abstract thinking and some people who are better at seeing things which the abstract thinker might overlook. I really do not know whether the psychologists will come to the conclusion that it is the result of early training or that there really is a difference in abilities. My suspicion is that it is a difference in abilities; training alone will not produce a first-class scientist, just as the best training cannot make a first-class composer.

The second requirement is that, apart from obedience, you must enjoy what you do to do it well. Here you have the other answer given before, namely that I do science because I enjoy doing science. This is part of the answer, for, apart from the motive of obedience, that you enjoy doing it means that you are obviously gifted, and it means that because you enjoy doing it you are going to do it well. This is one of the psychological requirements, but, now, what is the rational justification for doing science? Well, if you want to give a rational justification for doing science, you must first ask: what *do* you do when you do science?

Now, in speaking of natural science, the aim of natural science is an increase in the knowledge and understanding of nature, where by nature is meant the external world. Now, I have to apologize if I misuse a word, because I am not, as you know, a philosopher, but, as I understand it, St. Thomas teaches that of man's faculties, the intellect is the primary faculty. In the process of knowing the intellect makes the object known intentionally its own; and in that, the intellect has an inborn and natural and unavoidable drive to increase the range of things which it can make its own. Therefore, we have to state that the primary object of science is the attempt to bring about this perfection of the intellect, as far, at least, as it extends to the external world. And, accordingly, the rational justification for science really lies in this perfection of the intellect, not in the perfection of the intellect of the scientist himself, for if that were the only activity, it would be a selfish one; but in helping to perfect the intellect of the whole group by making the results of science known to all. What I am trying to say is that the rational justification for scientific activity is at once connected to the common good; but the common good does not consist of material good only, but more importantly of the intellectual good, and this, in turn, is not to be restricted to the

intellectual good of the scientist alone but must have an effect on the common intellectual good.

This, I think, is a sufficient rational justification of the profession of the scientist, and it is therefore, a justification which can stand at least on a par with the justification of any other profession, on a par insofar as an intellectual profession is on a par with any other natural profession. Thus far we have discussed the philosophical question. Now, we come to the question of the individual Catholic and the individual natural scientist.

For the Catholic, there are the following points: I will first enumerate them and then discuss them in detail. First, a purely apologetic point is involved. Secondly, there is the problem of spreading the individual apostolate in all layers. Thirdly, there is a social point. What I mean by that I will say in just a moment. Fourthly, and most importantly, there is the question of the Catholic influence on ideas. Finally, there is the necessary role of the Catholic scientist in not only bringing Catholic ideas to non-Catholic scientists, but also in bringing science to his Catholic co-religionists. Therefore he is acting as a liaison between his Catholicism and science, and between science and his co-religionists. Now, let us discuss these points in detail.

I shall begin by saying that the presence of Catholic scientists in scientific activities is the strongest rebuttal against the accusation that the Church is the enemy of science. This accusation is very often answered by bringing up examples from the fifteenth and seventeenth centuries. This is not very effective. You have to bring examples from the present. Here, we have to say, unfortunately, that there aren't enough examples which can be brought forward. There is simply no doubt that we do *not* have our proportionate share of Catholic scientists. We form between a fifth and a sixth of the population, but we do not produce between a fifth and a sixth of the scientists. Why that is so, I will discuss a little later. I have no really good reason; I can only make hypotheses. But that it *is* so, there seems no doubt.

There have been studies made and published recently by what is called *American Men of Science*, a sort of professional directory. This does not give the religion of the man, but it does state whether he has studied in a Catholic college, as well as his previous training. Such studies were published about three years ago for the United States, and it was found that the fraction of scientists who had come from Catholic colleges was very small. There has just been published an analogous study for Canada, and in the three Catholic schools listed, the percentage is low, but not the lowest. Now, I think, of course, that the situation has been improving quite a bit. These studies, of necessity, really refer to a situation existing twenty years ago, because

the men in the 1948 edition of *American Men of Science* went to school about twenty years ago, and I think that in twenty years, the situation *will* be much better.

We have still a long way to go, however, not only in the sciences, but in other intellectual fields as well. For example, five years ago, those who were in charge of the occupation in Germany wanted very much to get six Catholic Ph.D.'s in Education to put in charge of sections of educational administrations in Germany, and they were just not to be found. As a result, non-Catholics were placed there. This is the kind of thing we will discuss later when we talk on the lack of influence of Catholic ideas on American public life.

The next point to be discussed is quite clear. For example, the Christophers emphasize very much the personal influence each individual should have in his immediate surroundings. If you don't have Catholic scientists, then, in the circle of scientists there will be no such influence. As an example of this personal influence which the Christophers emphasize we can take in the prevention of undesirable events which might occur in scientific circles. It would be far better if we Catholics could prevent them from happening rather than protest loudly when they do occur, and you can only prevent a thing from happening if you are actually there.

Closely connected with this point, I think that it is in general unhealthy to have any group excluded from any profession or set or activity. This always leads to an explosion somehow. If any group is excluded from one set, that means that it will necessarily concentrate in another professional set. This, in recent years at least, has always led to trouble.

There is now the most important problem which I have to touch upon, and on which I have touched already, and it is the problem of the Catholic influence on ideas. The influence of ideas has been considerable mostly on the thinking and the action of the world. Scientific work itself does not always lead directly to problems that are, shall I say, of immediate Catholic interest. However in work of this kind there is always the tendency for generalization, and this generalization, though it goes beyond the bounds of science, is often greatly stimulated by scientific research. Many such general ideas have a wide and profound influence on men—think for a moment how different our thought would be today if Darwin had been a Catholic. Biological evolution would have developed, but if the originator of that theory had been a Catholic, then the generalizations would be denied by him from the very beginning and would not have done so much harm. It would have been very much more difficult to make these harmful generalizations that are misused.

There are other problems occurring all the time which have either practical or philosophical consequences; but one of the things which is relatively new in the history of science is the rapidity with which the purely scientific has practical consequences. Here again there are Catholic scientists intimately connected with the purely scientific and these can influence the practical consequences.

Let me then, finally, go into the question of why American Catholics have, up to now, gone in relatively little for science. This is, of course, a very complicated question, and I cannot give any definitive answer. What I say here is, to a great extent, speculation.

First, one can, in general, divide vocations into those that are intellectual or speculative, and those that are more practical. Now, whether one approves of it or not, it is a fact, I think, that American Catholics are influenced by an activistic philosophy: "do something". Americans, in general, are influenced by that; but, in the United States, as a whole, there are enough exceptions although the percentage of exceptions is not as high among the Catholics.

There is another point involved, namely, that American Catholics have a predilection for dealing with people and not dealing with things. Where this comes from, I don't know, whether it is a question of temperament, or whether it is a question of feeling that direct action is what is required.

There is another point which one can look at. It is interesting to look at the past and to see through the various periods of history in which countries the center of scientific activity has lain. Now, of course, in the Middle Ages, you couldn't ask such a question because there was so much moving around; scientific activity was principally centered in the orders whose members had no fixed place but might be sent today to Cologne, tomorrow to Paris. With the Renaissance, however, there was a change. It is obvious that during the Renaissance the center of scientific activity was in Italy. Now this Italian scientific labor remained relatively high almost to the beginning of the nineteenth century; but in the nineteenth century it fell, and throughout most of that century it remained fairly low. Then, France came up, and for quite a number of years, one could say that France was the leading scientific country. England had been on a pretty high level during that same time, whereas there was not much in Germany until relatively late. In the United States there was not really any scientific activity until the early part of the twentieth century, although now, at this very moment, a very great deal of scientific activity is concentrated in the United States. You ask yourself, what causes this change? Again, I cannot really give a good explanation. It seems to me that one of the things you must say, even though a Marxist

might say the same, is that it is a fact that scientific activity *needs* a certain economic level to support it, because scientific activity does not, as a rule, bring immediate profit to society as a whole.

What I am saying here about the necessity and the advantages of Catholic scientists, is not something you can write down as a factor which definitely brings in so much money or gains so many converts. The activity of the scientist that can increase the common good lies in rather subtle things, in things prevented, which you can't prove have been prevented, in good influences; and you have to be able to afford this over a long period of time and in spite of the fact that you can't prove to anyone that it will bring you a new gymnasium.

Therefore, it is necessary to develop scientific activity, until you have such a surplus that you can afford to support a man who does not bring you immediate profit. If you have to live from hand-to-mouth, that is just not possible. If all this is so, then we can, perhaps, partially explain the lack of Catholic scientists in the past by pointing to the economic level of Catholic institutions in general. Though this has been considerably improved in recent years, I have yet to hear any school say that it has too much money. As I say, that is part of the explanation. It is surely not the whole explanation.

A far more important point is the question of evaluation. In order to develop scientists you have to see that scientific activity is valuable, you have to realize that the people engaged in science are not queer, that they are not persons unable to do anything else, men whom you support, as it were, out of charity. Even when such is the popular attitude, there will still be people who do not care, who are driven so strongly that they will go into science as a career; these however will be few. If the general popular opinion is widespread that to get up in the world, or to be useful in the world, you have to be a lawyer or a doctor, then this is what the ambitious young man will choose, not because he is ambitious, but because the whole weight of public opinion favors it. In a group with such an atmosphere, the proportion of scientists will be low. The Catholics of the United States will not have their share of scientists until that day when the Catholics, as a group, consider a career in science as something to be valued highly. The real driving force has to be the spiritual one; but, after all, if you have a choice, you can obey the spiritual commands in any vocation.

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